International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 10, 2020
ISSN: 1475-7192

IoT Based Automatic Electric Appliances Controlling Device based on Visitor Counter

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Abstract

The 21st Centaury is considered the Era of automation and Artificial Intelligence. Electricity and power sectors are required automation in various levels including grid level as well as home appliances level. IoT has played a significant role to achieve automation at home/office level. Home Automation, Smart Cities, Agriculture and many more sectors have used IoT to automate ON/OFF functioning of Electrical appliances/ Machinery. We are adding one more level to this automation where we have developed a device to do ON/OFF function automatically based on person count entering/exiting in/from a room. It will impact an organization financially and environmentally. It will help an organization to use their electrical appliance effectively. Unnecessary usage of appliances can be avoided using this controlling device. This device is designed using basic electronic components.

Keywords: *Sensor, Power Supply, Energy Conservation, Infrared Sensors (IR), Bidirectional Visitor Counter, Microcontroller, Relay.*

I. Introduction

This work is thought and implemented to match the need of 21st century. Today we are going for automation for ease and at the same time for sustainability as well. Using resource efficiently should be the primary concern for any automation. Saving Electricity is directly linked with saving environment. In this work we have achieved both the parameters. Using the combination of latest and traditional components we have designed a device which will provide automation for ease and efficiently manage all equipments effectively. Documentation of

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Received: 15 May 2020 | Revised: 5 Jun 2020| Accepted: 20 July 2020

the human living system is becoming faster and more accurate. Society is now moving forward at a fiery pace. The twenty-first century means that to deal with speed and accuracy, people take the path of electronic automation. From adding two numbers to solving complex calculations, from opening a door to launching a rocket, you are dominated by electronic controllers everywhere. We need to maintain balance with the increase in positivity. Disaster caused by natural and humanitarian disasters can be avoided, or at least a lot of damage can be done before care is taken. The purpose of this work is to meet the needs of the user, if not completely. This research work is a good combination of analog and digital electronics. The work includes the automatic opening / closing of the power supply through a personal counter unit and relay. We used microcontrollers as a major part of the work.

II. Literature Review

IoT has been implemented in many electrical appliances. Home Automation, Smart Cities, Automatic irrigation Systems, Healthcare and many more are the key areas where IoT has provided automation and help humanity to reduce their manual work. Many work has been done to Auto ON/OFF electrical equiments but counting based implementation is not done as of now. The device has been designed with basic components and automation coding module is also integrated in basic and reliable Micro Controller (AT89s51). IR Transmitters are used for counting purpose. LCD display is used for display messages.

Many papers have explained many complex automated circuitry and devices. However, we have designed a very basic circuitry for the same purpose with some more features. They have not shared their executed and integrated code in microcontroller but for extending this work further we are also sharing the code in section 7.

III. Block Diagram

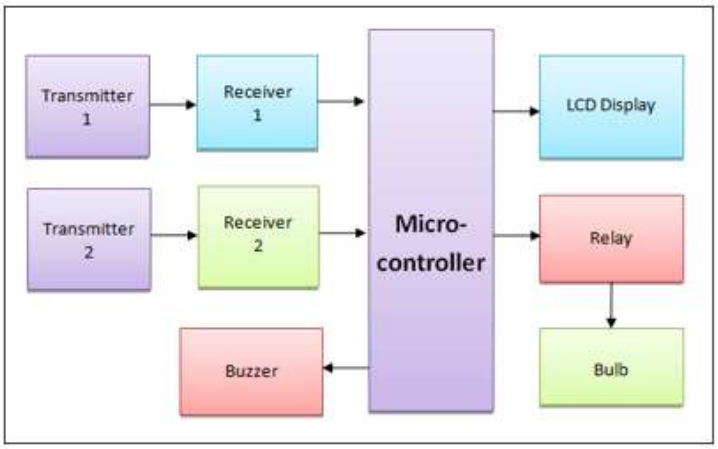

Fig 1 Block diagram of Module

Received: 15 May 2020 | Revised: 5 Jun 2020| Accepted: 20 July 2020

IV. Electric Circuit Modules

4.1. Microcontroller Module

4.1.1 IR SENSOR:

IR sensors are used for counting visitors in room. We used TIL 38 as an IR transmitter. IR receiver: We used the TSOP 1738 as an IR receiver. The frequency range is 38 KHz at the input. This is an active low device, which means it produces less output when the IR beams at the input.

4.1.2. LCD:

16 Segment LCD display is used for display the message on screen. It is used to show the counter on screen. It display Incremented counter on Entry and Decremented counter on Exit.

4.1.3.RELAY:

230 Volt AC relay is used for ON/OFF the AC devices. It will help to smoothly breaking the circuit for AC device.

4.1.4 MICRO-CONTROLLER (89S51)

8085 Microcontroller is used for implementing counter based logic. We have shared the code for the same login that we have implemented in this circuit

V. Circuit Diagram

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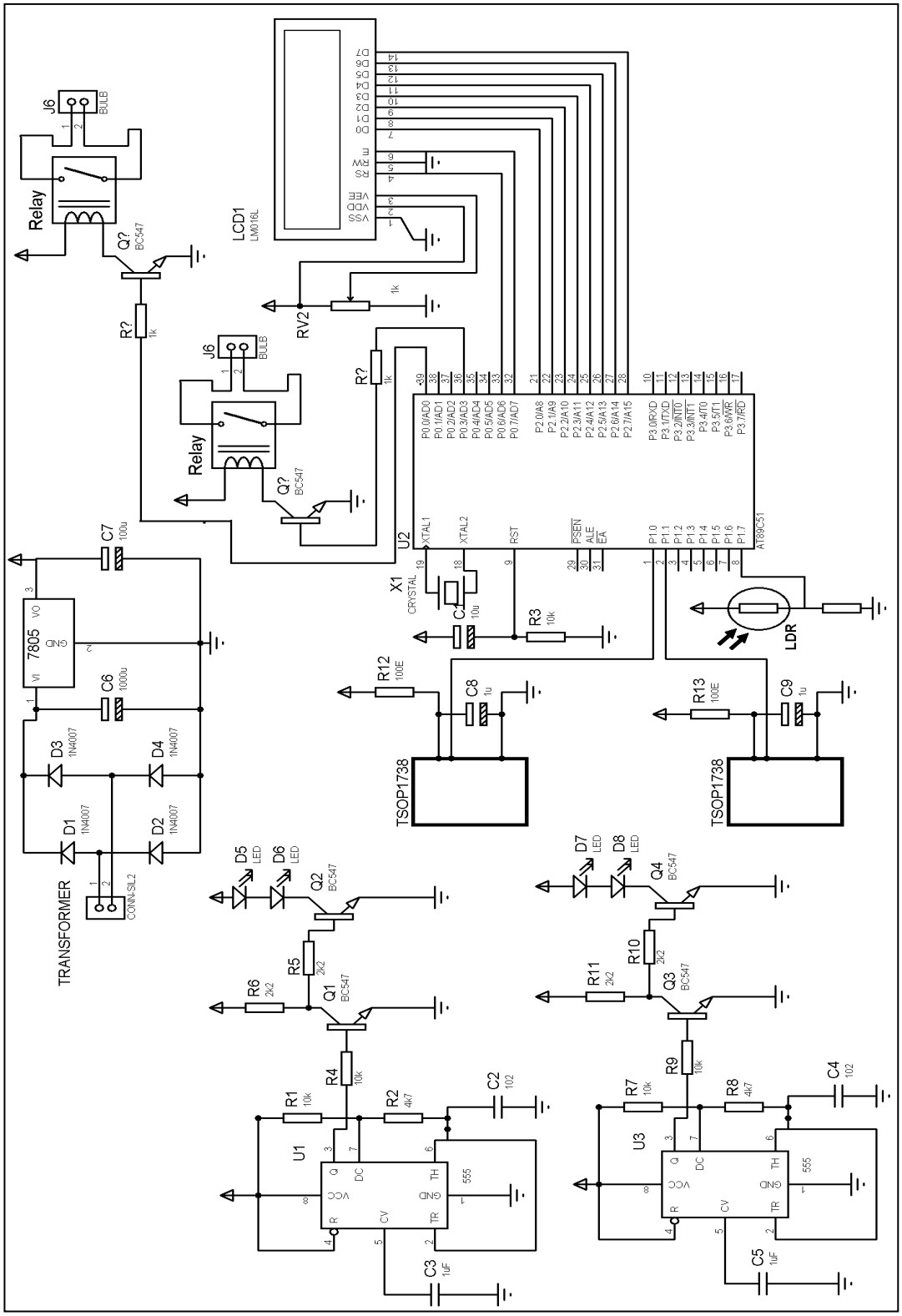

Fig 2: Circuit Diagram

VI. Algorithm

1. Begin
2. Reset the LCD
3. Display the Message “UPES ”
4. Initialize Counter = zero,
5. Display the Message "STUDENTS = "
6. Check for Rec 1 is crossed. If this is not case than go to instruction 8
7. If Rec 1 is crossed than check Rec2 is also crossed. If this is the case increase on person count. Display that Person count on LCD. Go to Instruction 10
8. Check if Rec 2 is cut first , If this is not the case go to instruction no. 6
9. If Rec 2 is crossed and Rec 1 is also crossed after Rec 1 than decrease on person count. Display person count on LCD. Go to instruction 10.
10. Check if counter is greater than zero. If yes, turn on Relay 1 and go to Step 15
11. Check if counter is greater than OR equal to 5. If yes, turn on Relay 2 and go to Step 15
12. Check if counter is less than 5. If yes, turn off Relay 2.
13. Check if counter is equal to 0. If yes, turn off Relay 1.
14. If counter is equal to zero then turn off relay and go to Step 15
15. Go to step 6

VII. Methodology

The methodology we have used for implementing this device is not much complex. We have used ordinary IR sensors, Ordinary Microcontroller and other basic electronic components. We have designed a complete Electric circuit and we have also implemented code to instruct microcontroller for provide the required function of Switch ON/OFF the required appliances based on person count. IoT has been used here for automation.

The circuit is designed in such a way that the counter will regulate the ON/OFF mechanism of appliances connected in a room. When the first person will enter in a room One fan and One light will be ON automatically. Next fan and light will be switched ON after getting a counting number of Five. The counting threshold can be changed as per the requirement of the organization. Same algorithm will work at the time of Exiting from the same room.

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Working flow has been shown in next two charts and implementation also shown in next section.

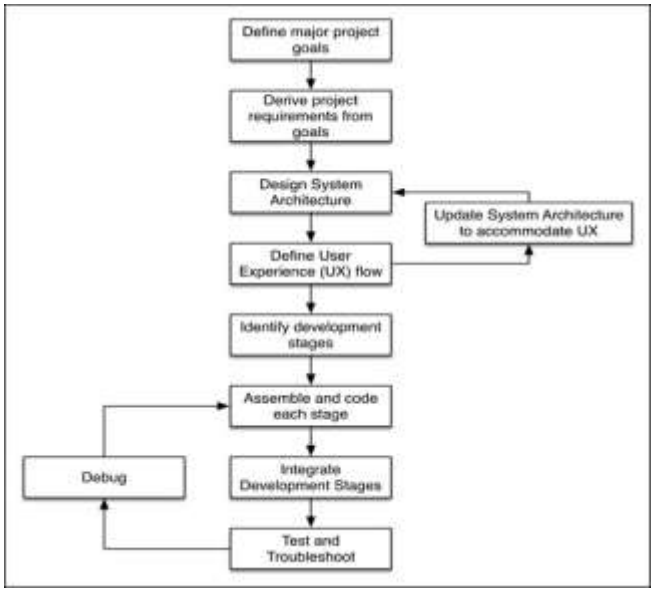

Fig 3: Methodology chart

VIII. Flow Chart

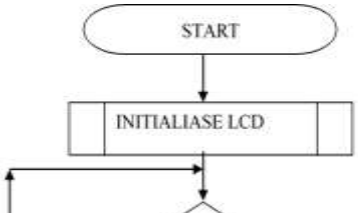

Fig 3: Flow chart

IX. Implementation

```
not_zero:movdptr,#Perscntrdecr
callLCDdisp
call Delay2sec
movdptr,#MsgnoofPerson
callLCDdisp
calldisp_Person

cjne r7,#00,Person_cntr_ret1
Person_cntr_ret1:       ret

Chk_time_out_two: ret
```

```
LCDdata:setbLCDrs
setbLCDen
nop
nop
clrLCDen
callLCDdelay
ret

LCDdelay: mov 40h,#10
LCDdelay1: mov 41h,#250
djnz 40h,$
```

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```
disp_Person:mov a,r7
mov b,#10
divab
add a,#30h
mov 45h,a

mova,b
add a,#30h
mov 46h,a

movLCDdatabus,#cch
callLCDcmd
mov LCDdatabus,45h
callLCDdata

movLCDdatabus,#cdh
callLCDcmd
mov LCDdatabus,46h
callLCDdata
ret

initialisation:call LCDinit
movdptr,#Msgwelcome
callLCDdisp
call Delay2sec
djnz 41h,LCDdelay1
ret

LCDdisp: movc a,@a+dptr
cjne a,#'@',LCDdisp1
mov LCDdatabus,#c0h
callLCDcmd
jmpLCDdisp
LCDdisp1:cjne a,#'$',LCDdisp3
ret
LCDdisp3:movLCDdatabus,a
callLCDdata
jmpLCDdisp

Delay2sec:mov 40h,#20
Del2sec2:mov 41h,#200
Del2sec1:mov 42h,#250
djnz 40h,$
djnz 41h,Del2sec1
djnz 42h,Del2sec2
ret

Delhalf:call Delaywait
callDelaywait
ret

Delaywait:mov 40h,#3
```

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```
        movdptr,#MsgnoofPerson
        callLCDdisp
        ret


LCDinit:mov LCDdatabus,#38h
        callLCDcmd
        mov LCDdatabus,#0ch
        callLCDcmd
        mov LCDdatabus,#01h
        callLCDcmd
        mov LCDdatabus,#06h
        callLCDcmd
        ret
LCDcmd:clrLCDrs
        setbLCDen
        nop
        nop
        clrLCDen
        callLCDdelay
        ret
```

```
Delaywait1:mov 41h,#100
Delaywait2:mov 42h,#250
        djnz 40h,$
        djnz 41h,Delaywait2
        djnz 42h,Delaywait1
        ret
MsgnoofPerson:DB "NO OF STUDENTS
IN@THE ROOM =      $"
Perscntrincr:DB " PERSON COUNTER
@  INCREMENTED   $"
Perscntrdecr:DB " PERSON COUNTER
@  DECREMENTED   $"
Msgdaytime:DB "Light Intensity
@High => Day Time$"
Msgnighttime: DB "Light Intensity
@Low =>Night Time$"
            END
```

X. Conclusion

With the knowledge of new techniques in 'Electronics' we are able to make our life more comfortable. One such application of electronics is used in "Automatic room light controller with visitor counter" The approach we followed and which is explained in this work report is novel and has achieved the target of "Automatic room light controller with visitor counter" satisfying user needs and requirements. The same circuit finds its use in many more applications. By this the Electricity saving can be done. Thus we can save power. The number of person inside the room will be displayed on the LCD. The development of this work has shown how much hard work goes into the

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creation of a system. "Automatic room light controller with visitor counter" was a work based on microcontroller, due to which hardware requirement is reduced. Embarking of this work has helped us in developing a team spirit, patience and time management necessary for today's technical professionals. Hence we can conclude that the required goals and objectives of our work have been achieved. This work has built in us confidence that any problem can be solved with sheer determination, hard work and optimism. We feel that our product serves something good to this world and we like to present it before this prosperous world. By doing this work, we were better able to understand the various facets of doing an embedded system work which is emerging as one of the most 'in demand' technologies right now.

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